Energy Technologies Area   Lawrence Berkeley National Laboratory

The Future of U.S. Electricity Efficiency Programs Funded by Utility Customers:

Program Spending and Savings Projections to 2030

Charles A. Goldman, Sean Murphy, Ian Hoffman,

Natalie Mims Frick, Greg Leventis and Lisa Schwartz

Electricity Markets and Policy Group

Summary

November 2018

The work described in this presentation was supported by the U.S. Department of Energy's Office of Electricity, Transmission Permitting and Technical Assistance Division, Office of Energy Efficiency and Renewable Energy-Strategic Priorities and Impact Analysis, and Office of Energy Policy and Systems Analysis, and the U.S. Environmental Protection Agency, under Lawrence Berkeley National Laboratory Contract No. DE-AC02-05CH11231.

Report: Table of Contents

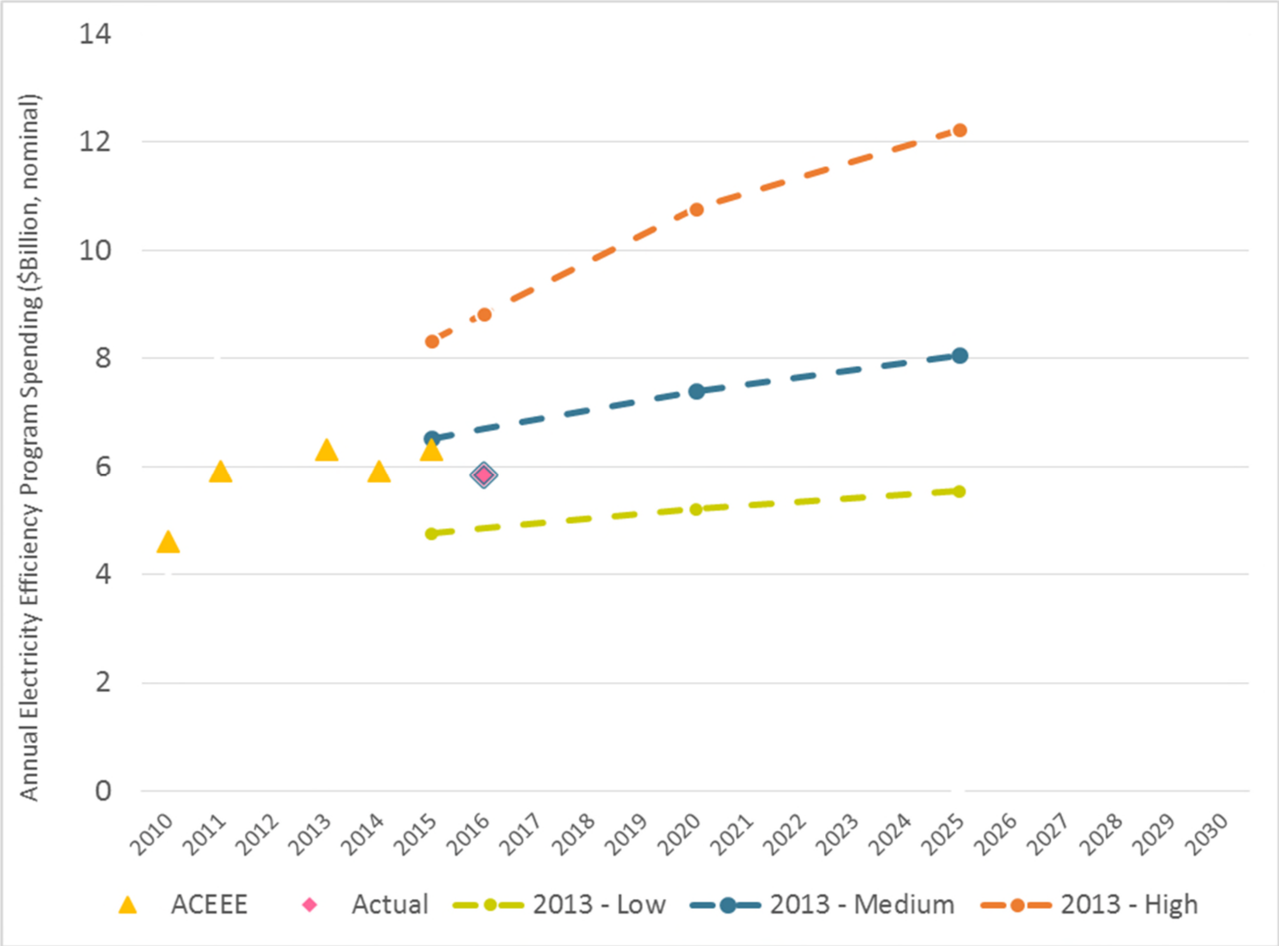
Introduction

- LBNL published reports in 2009 and 2013 on projected spending and savings to 2020 and 2025 for customer-funded energy efficiency (EE) programs for all types of utilities and program administrators (PAs) in every state.
- This study updates that analysis and extends the projections to 2030 for three scenarios (low, medium, high), with updated projections for interim years, and focuses solely on the electricity sector.
  - We do not envision or quantify the impact of potential new EE drivers and delivery mechanisms.
  - Instead, we provide an analytically rigorous assessment of what we know and expect regarding the future of electricity efficiency programs funded by utility customers, based on current state policies and market drivers and constraints and a range of likely scenarios through 2030.
- Since the last study, the policy landscape and market drivers for customer-funded EE programs have changed significantly in many states.
- Understanding potential pathways for evolution of ratepayer-funded energy efficiency—and their impact on future electricity markets (e.g., load growth), infrastructure needs and the energy services industry—is important to grid operators, utility planners, policymakers, regulators, program administrators and stakeholders.

Recent Trends in Electricity Efficiency Program Spending

Electricity Efficiency Program Spending: Historical Trends

- Reported spending on electricity efficiency programs increased from $4.6B in 2010 to $6.3B in 2015
- Actual spending in 2015 was 97% of LBNL's medium scenario projection in our 2013 study ($6.3B vs. $6.5B)
- Actual spending in 2016 ($5.8B) was between our low and medium scenarios in our 2013 study



Electricity efficiency programs: Actual spending (2010 to 2016) compared to projected spending in the 2013 LBNL study

Source: Barbose et al. (2013)

Electricity Efficiency Program Spending: Top 10 States

- Actual spending on electricity efficiency programs was ~$5.8B in 2016
- Ten states account for about 61% of total U.S. spending on these programs
- CA alone accounts for ~20% of total electricity efficiency spending

2016 Spending on electricity efficiency programs

Rank	State	2016 Spending on Electricity Efficiency Programs ($ million)
1	CA	1164
2	MA	521
3	NY	425
4	PA	238
5	WA	234
6	IL	219
7	CT	205
8	TX	200
9	MI	188
10	MD	184
	Top 10 States	**$3,579**
	% of U.S. spending	61%
	Remaining U.S. States	**$2,242**
	% of US spending	39%
	Total U.S.	**$5,823**

Project Overview & Approach

Analytical Approach

- State-by-state projections of electricity efficiency program spending and savings (kWh) to 2030
  - Based on detailed review of state policy drivers—e.g., EE resource standards (EERS), all cost-effective EE statutes, system benefit charge (SBC), demand-side management (DSM) plans, integrated resource plans (IRPs), utility business model changes that support EE—and performance of program administrators
- Captures efforts and prospects of all electric utilities—investor-owned utilities (IOUs), publicly-owned utilities (POUs) and rural electric coops—and other ratepayer-funded program administrators
- Three scenarios—low, medium and high—designed to capture alternative pathways for evolution of EE programs
  - Policy implementation and efficacy (e.g., performance of administrators)
  - Broader policy and market drivers and constraints
  - State-specific scenarios informed by ~50 interviews with public utility commission (PUC) staff, program administrators and EE experts
  - None of the scenarios is intended to capture wholesale shifts in federal policies

Modeling Approach for each State

We approach a state from three directions:

Ownership
- IOUs
- POUs and rural electric coops

Period
- Historical
- Policy (Analysis of existing policies in near- and mid-term)
- Post-policy (Speculation on future/long-term policy environment and drivers)

Scenario
- Low
- Medium
- High

…to develop EE spending and savings projections

Modeling Future Spending and Savings

Historical
2013–2016

Actual EE spending, savings data

- Sources: LBNL DSM Program Database, EIA 861, and PA filings

Policy
e.g., 2017–2024

Current, planned & projected EE spending and savings

- Sources: DSM plans, PUC orders, statutes (EERS, SBC, all cost-effective EE mandates, spending minimums, lost-revenue recovery, performance incentives), IRP

Post-Policy
e.g., 2025–2030

Forecast spending and savings

- Extrapolation from historical performance, IRP
- Interviews and Expert judgment
- Regional "best practices" (high case)

- Historical – collect information on actual program spending and savings to establish an initial relationship between costs and first-year savings
- Policy period – duration varies by state; project future savings and spending driven by explicit state policies or plans
- Post-policy period – Policy commitments are less firm or have ended; rely on interviews, expert judgment, and regional best practices to define a range of savings targets for each state

Scenario Analysis: Key Policy Drivers for Spending and Savings

Key Policy Drivers	States Where Applicable to Electricity Efficiency Programs
Energy efficiency resource standard	AZ, CA, CO, HI, IL, MD, MI, MN, NJ, NM, NV, NY, OH, PA, TX, VA, VT, WI
Energy efficiency eligibility under state renewable portfolio standards	MI, NC, NV, OH
Voluntary savings target	IA, IN, MN, MO, UT
Statutory requirement that utilities acquire all cost-effective energy efficiency	CA, CT, MA, ME, NH, OR, RI, VT, WA
System/public benefit charge	CA, CT, DC, HI, MA, MT, NH, NJ, NY, OH, OR, RI
Regional Greenhouse Gas Initiative	CT, DE, ME, MD, MA, NH, NY, RI, VT, *NJ, VA**
Integrated resource plan	28 states (primarily in the West and South)
Demand-side management plan, multi-year energy efficiency budget or both	46 states
Utility business model (e.g., decoupling, lost revenue adjustment, shareholder incentives for performance)	27 states

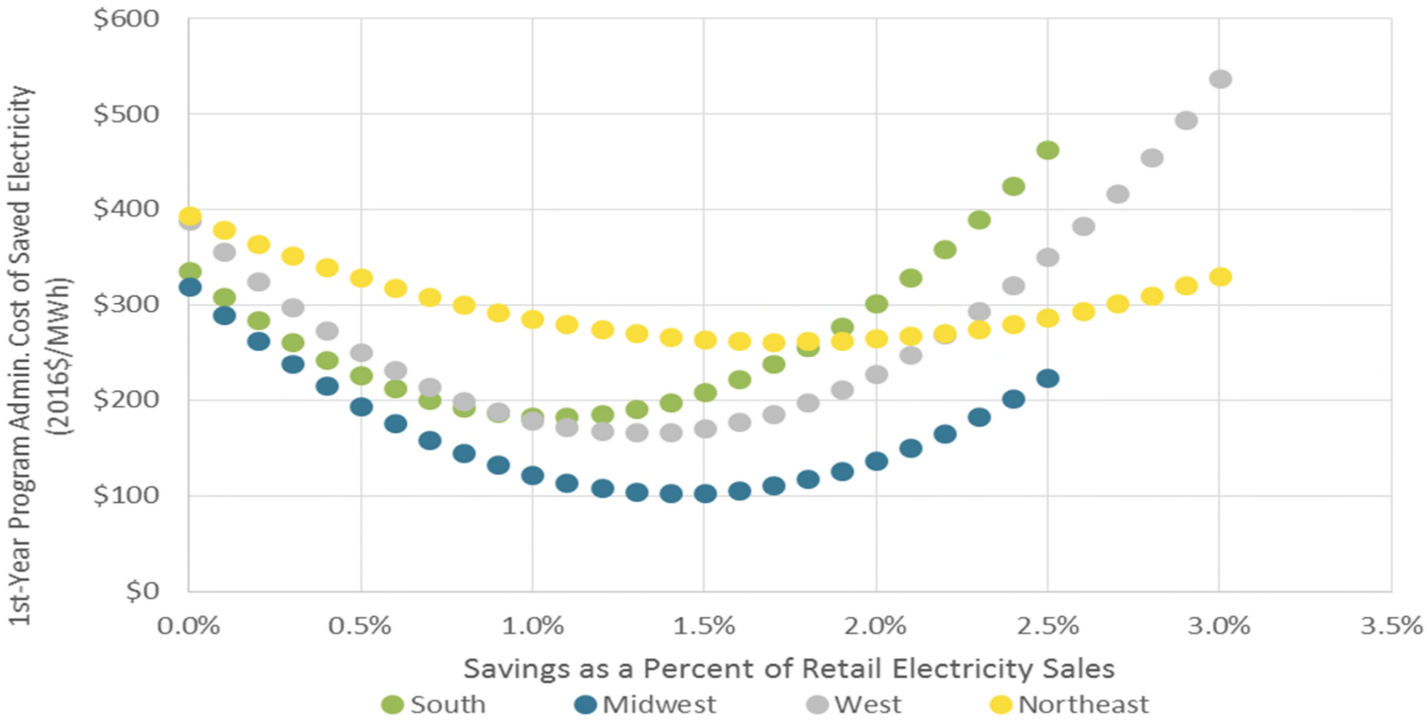
* *New Jersey and Virginia are considering joining RGGI, which will provide some revenues for program administrators in the future.*

Scenario Analysis: Key Policy and Market Constraints

Key Policy and/or Market Constraints on Efficiency Program Spending and Savings	Examples from Selected States
Statutory or regulatory caps on rate impacts or program spending	WI, MI, PA, TX
Legislative or executive redirection of EE funding to other state purposes	CT, NJ
Large commercial and industrial (C&I) opt out from EE charges, programs	AR, IA, IL, IN, KY, ME, MO, NC, OH, OK, SC, VA, WV

- Some states have adopted policies that effectively constrain magnitude of available savings from efficiency programs
  - **Statutory or regulatory caps on rate impacts or spending**: Additional limits on EE spending by capping portion of rates that can be dedicated to efficiency spending or capping total expenditures
  - **Large C&I opt-out**: Allow eligible customers to stop paying charges for funding EE programs. We included information on amount of retail load that had opted out of participating in utility efficiency programs and/or projected retail load eligible to opt out based upon customer size thresholds

Regional Cost of Saving Electricity Curves for Investor-owned Utilities



Source: LBNL DSM Program database, Cost of Saved Energy Project

- Regression analysis results by Census region for first-year cost of savings vs. first-year savings as a % of retail sales based on data for 115 program administrators between 2009-2015
- We used historic, state-specific cost of saved electricity values and then applied the regional cost of savings function slope to estimate spending in future years given projected savings level

Key Scenario Assumptions: South

Region	Scenario	Assumptions for Selected States
South	Low	• Arizona – Same as medium scenario. • Florida – Same as medium scenario. • North Carolina – IOUs achieve 2018 target, then savings are lower to 2030 based on IRP base case and more C&I customer opt-out (0.6%).
	Medium	• Arizona – IOUs meet EERS targets through 2019 (1.5%), then goals set based on achievable potential (1%) in 2030, subject to C&I opt-out (~18% of load). • Florida – State-regulated utilities achieve very modest savings goals set in 2014 Florida Energy Efficiency and Conservation Act proceeding (0.07%) to 2024. • North Carolina – IOUs achieve targets through 2018 (1.3%), then savings decline to the maximum allowable for efficiency under the state RPS (0.75%).
	High	• Arizona – IOUs meet EERS targets through 2019 and sustain 1.5% savings through 2030. • Florida – State-regulated utilities achieve savings goals to 2019, then increase savings by 0.15% per year to a maximum of 0.5% savings as % of retail sales based on achievable potential. • North Carolina – IOUs meet 2018 targets (1.3%) and continue to perform at that level to 2030.

Key Scenario Assumptions: Midwest

Region	Scenario	Assumptions for Selected States
Midwest	Low	• Illinois – See medium case for new law provisions; assume IOUs meet DSM plan targets to 2021, then savings decrease (0.9%) as C&I opt-out excludes 10-30% of load with efficiency opportunities. • Iowa – See medium case for new law provisions; assume customers representing 50% of revenues drop out within two years, increasing to 70% by 2030. Savings decrease to 0.17% by 2030. • Michigan – Assume EERS is not extended after 2021; IOUs meet their near-term DSM targets to 2021 but reduce their efforts somewhat after that (0.8% in 2030).
	Medium	• Illinois – 2017 law includes EERS with aggressive cumulative savings goals and excludes large customers (>10 MW peak demand). Assume IOUs meet DSM plan targets to 2021, then savings decline modestly to 2030 given favorable energy efficiency business model (1.2%). • Iowa – 2018 law allows all customers to opt out of efficiency program charges and caps spending at 2% of revenues for remaining customers; assume customers representing 33% of revenues opt out in two years, increasing to 50% by 2030. Savings decrease from 1.2% in 2017 to 0.26% by 2030. • Michigan – EERS sunsets in 2021; utilities submit DSM plan and have attractive efficiency business model; assume IOUs meet near-term DSM savings goals (1.5% in 2021) and sustain targets to 2030, motivated by opportunities for shareholder earnings.
	High	• Illinois – See medium case for new law provisions; assume IOUs meet DSM plan targets to 2021 and sustain those savings to 2030 given attractive business model (1.4%). • Iowa – See medium case for new law provisions; assume customers representing 20% of revenues opt out in two years, increasing to 40% by 2030. Savings decrease from 1.2% in 2017 to 0.3% by 2030. • Michigan – IOUs achieve higher savings target (1.7%) based on achievable market potential, driven by attractive performance incentives.

Key Scenario Assumptions: West

Region	Scenario	Assumptions for Selected States
West	Low	• California – See medium case for policy framework; assume difficulties in IOU transition to 3rd-party program managers, but savings recover somewhat after 2020. POUs reduce their efforts somewhat (0.9%). • Washington – See medium scenario for policy framework; assume IOU savings targets decrease from current levels (1.1% in 2018 to 0.5% in 2030) due to as low wholesale prices which erode cost-effectiveness and impact of appliance and equipment standards. • Arizona – IOUs fall short of EERS; savings after 2020 fall to IRP level; Salt River Project savings decline slightly.
	Medium	• California – Extensive policy support for efficiency with savings targets based on potential studies and aggressive state policies; assume IOUs meet current targets (1.7%), which decrease somewhat over time (1.4% in 2030); low-income savings decline somewhat. POUs meet targets (1.1% in 2030). • Washington – All-cost effective efficiency statute; Northwest Power and Conservation Council estimates efficiency potential. Assume IOUs maintain aggressive savings levels through mid-2020s (1.8% in 2025), but savings decline in later years of study period primarily due to impact of appliance and equipment efficiency standards (0.6% in 2030). • Arizona – EERS sunsets in 2020; after that, assume IOUs savings decrease from current levels for IOUs (1.7% in 2017 to 1.0% in 2030).
	High	• California – See medium case for policy framework; assume IOU savings rise to higher tier of achievable market potential (1.7% in 2030); low-income savings sustained. POUs meet targets. • Washington – See medium scenario for policy framework; assume IOUs and POUs achieve savings that are close to achievable potential (2% in 2025), but savings decline in later years due primarily to impact of efficiency standards. • Arizona – See medium scenario for policy framework; assume EERS requirements remain largely in place with IOU savings at 1.5% in 2030; Salt River Project maintains current savings (2.0%).

Key Scenario Assumptions: Northeast

Region	Scenario	Assumptions for Selected States
Northeast	Low	• Massachusetts – IOUs attain 90% of achievable savings potential through 2021 (3.4%), then savings decline in response to efficiency standards and lighting market transformation (1.75% in 2030). • New York – Same as Medium scenario to 2025. Then assume savings decline to 1.6% in 2030, consistent with low scenario of other regional leaders. • Connecticut – Assume state budget challenges continue to adversely impact efficiency program budgets and savings continue to decline (0.8% in 2030).
	Medium	• Massachusetts – All cost-effective efficiency mandate and business model. Assume strong policy support for efficiency continues and IOUs meet near-term savings goals (3.9% in 2021), but savings decline in later years in response to efficiency standards and lighting market transformation (2.2% in 2030). • New York – Governor announced higher statewide savings target for energy efficiency in 2018 (30,000 GWh for the period between 2015 and 2025). Assume IOUs achieve near-term savings goals (1.4%) to 2020 and then IOU and NYSERDA programs ramp up to 2% savings per year by 2025 to help achieve Governor’s energy goals along with NYPA and LIPA programs. After 2025, assume savings decline slighting to 1.9% in 2030. • Connecticut – Strong efficiency policy framework (acquire all cost-effective efficiency with business model), but state budgetary problems result in lower spending and savings; IOU savings decrease from 1.7% in 2017 to 1.0% in 2030.
	High	• Massachusetts – IOUs achieve potential through 2021 and, given strong policy support, continue to achieve high savings targets by adapting efficiency programs (2.5% in 2030). • New York – Same as medium scenario to 2025 (2%) and after 2025, assume savings remain at 2% per year through 2030. • Connecticut – Assume state budget challenges are resolved in several years and historic policy support for efficiency translates into increased program budgets (savings increase to 2017 levels in 2030 at 1.7%).

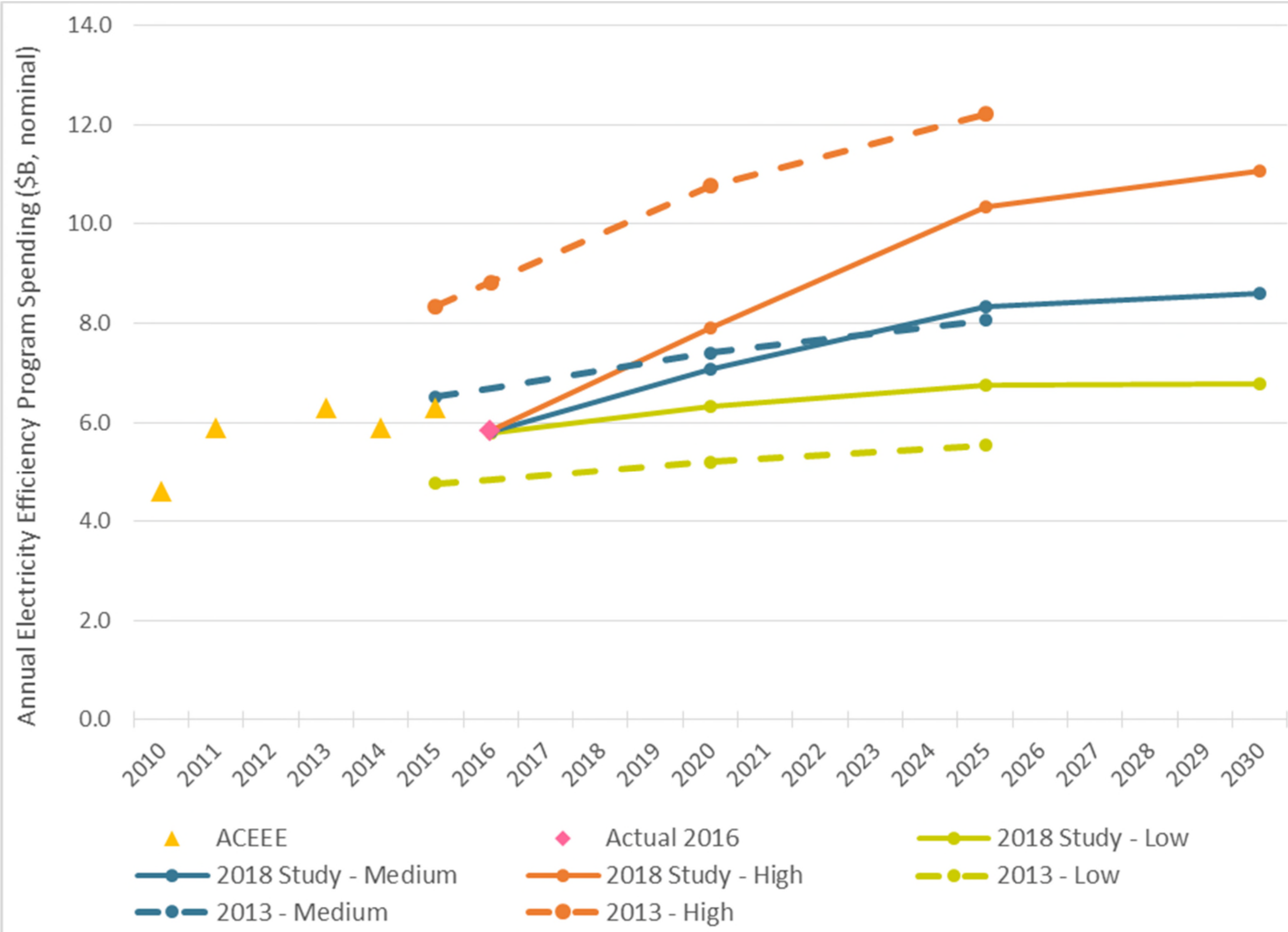
Results: National and Regional Projections for Electricity Efficiency Program Spending and Savings

Electricity Efficiency Program Spending: U.S.

Projected electricity efficiency program spending by program administrators to 2030 under three scenarios

- **Medium case**: Spending projected to increase to \$8.6B by 2030
  - 3-4% annual growth to 2025 but slows to <1% in 2025-2030 period
- **Low case**: Flat spending to 2030 (\$6.8B)
- **High case:** \$11.1 billion in 2030 (90% higher than 2016)
  - Driven primarily by the potential of the South and prospects for stronger spending in large states
- Total market activity leveraged by utility efficiency program increases (\$13-22 billion per year by 2030 in three scenarios vs. \$11.6B in 2016)

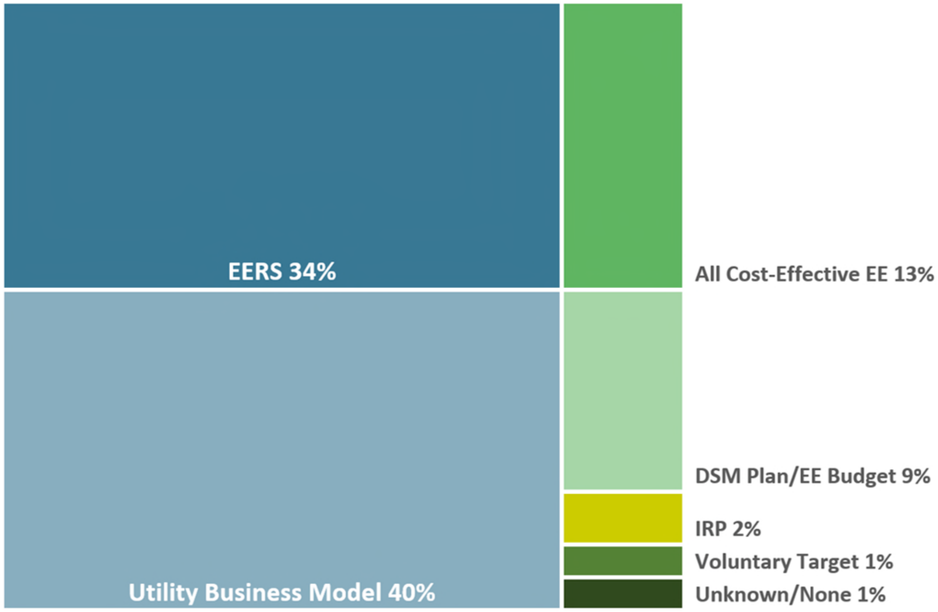
Spending Projections: 2013 vs. 2018 Study



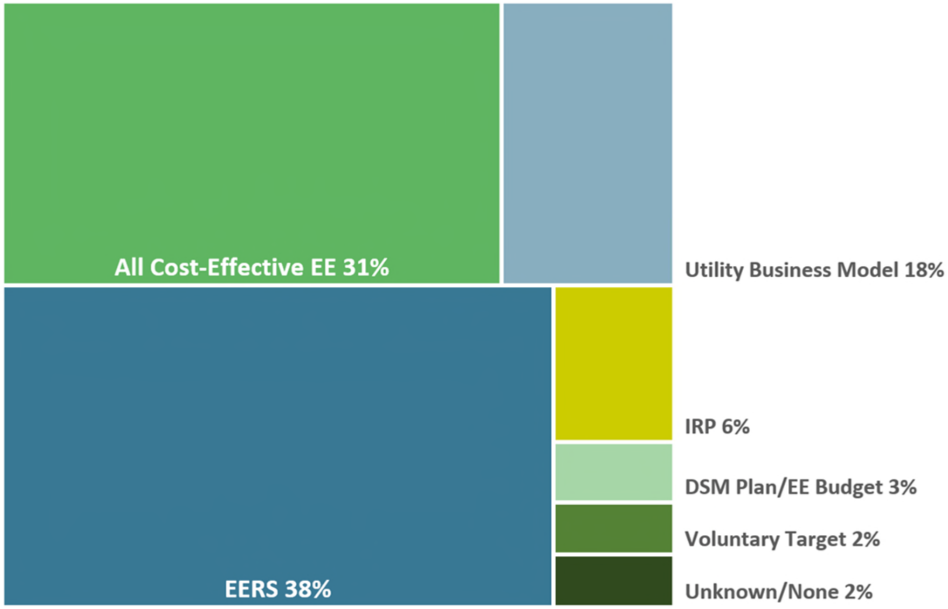
Reported spending on electricity efficiency programs (2010 to 2016) compared to projected spending in 2013 LBNL study and current (2018) LBNL study for low, medium and high scenarios

- Actual EE spending 2010-2015 (yellow triangles) and 2016 (pink diamond)
- Scenarios in our 2018 study have narrower spending range than 2013 LBNL study
- **Medium case**: projected spending slightly higher than 2013 study
- **High case**: projected spending is lower than 2013 study
- **Low case**: Projected spending higher than in 2013 study
- Projected growth in spending tends to be "front-loaded"; attributable to our methodological approach and cautious assessment of efficiency market dynamics beyond the near term

Program Spending by Primary Policy Driver



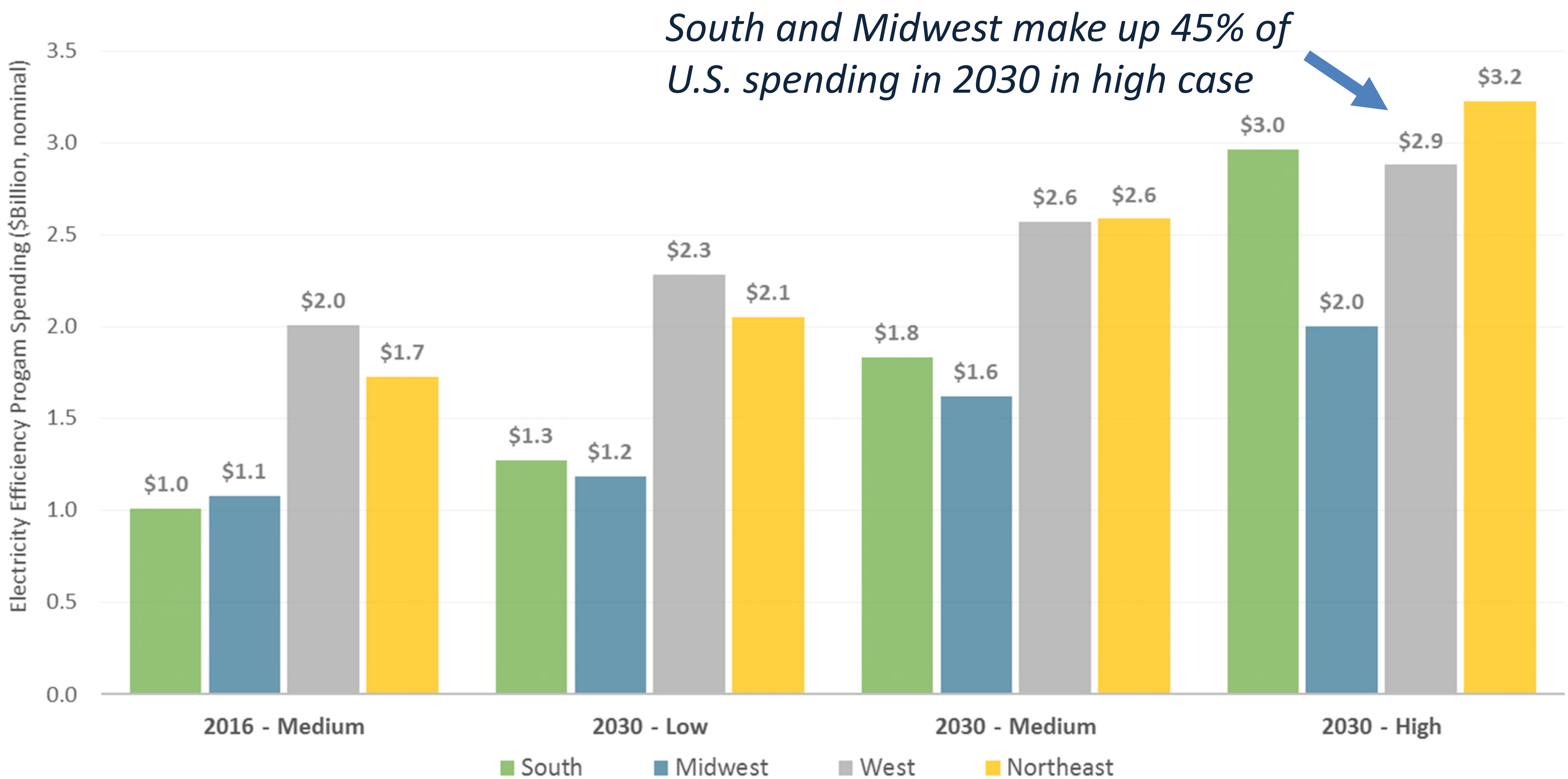
Medium Case 2020



Medium Case 2030

- Share of national electricity efficiency spending driven by primary policy driver in 2020 and 2030, based on our judgment of primary policy driver in each state
- Binding EERS targets and "all-cost-effective" statutes are a dominant influence in 17 states (47% of national spending)
- Utility business models are major influence in 2020 (15 states account for 40% of national spending), but persistence of those policies and their effects on program administrators are less certain in 2030

Efficiency Program Spending by Region



- **West and Northeast**: Account for ~60% of program spending in medium case
- **South**: Largest range in spending across scenarios ($1.3B to $3B)
- **West:** CA dominates (60%); lower spending in Pacific Northwest by 2030 (vs. 2020); spending steady in Southwest (except in low case)
- **Northeast:** Strong commitments (NY, NJ, NH) + historic leaders (MA, RI, VT) result in higher spending
- **Midwest**: Spending driven primarily by four populous states (IL, MI, MN and OH)

Program Spending as % of Retail Electric Utility Revenues

- EE spending in 2030 represents a higher share of retail revenues in the Northeast compared to other three regions (3.1%-5% vs. 0.5%-2.4%) because utilities in this region only provide distribution service
- EE spending as % of revenues in 2030 increasing only in high scenario (except West) compared to 2016
- South lags well behind West and Midwest in relative spending levels in all three scenarios

Funding Shifts Among Regions

	2016		2030 Medium Scenario		2030 High Scenario	
Rank	**State**	**Spending**	**State**	**Spending**	**State**	**Spending**
1	CA	1,164	CA	1,605	CA	1,650
2	NY	425	NY	894	NY	1,067
3	MA	521	MA	523	NJ	676
4	PA	238	NJ	489	TX	625
5	WA	234	MD	484	MA	589
6	IL	219	IL	464	MD	543
7	CT	205	TX	382	IL	540
8	TX	200	MI	316	FL	504
9	MI	188	PA	269	PA	360
10	MD	184	OH	227	MI	344
Top 10 States		**$3,579**		**$5,654**		**$6,897**
% of U.S. spending		61%		66%		62%
Remaining U.S. States		**$2,244**		**$2,961**		**$4,175**
% of US spending		39%		34%		38%
Total U.S.		**$5,823**		**$8,614**		**$11,072**

- 10 states comprise >60% of U.S. program spending in 2016 and 2030
- **Medium case**: WA and CT are replaced by NJ and OH in 2030
- **High case**: NY doubles spending in 2030 (based on policy); spending increases in TX, FL (based on achievable potential)

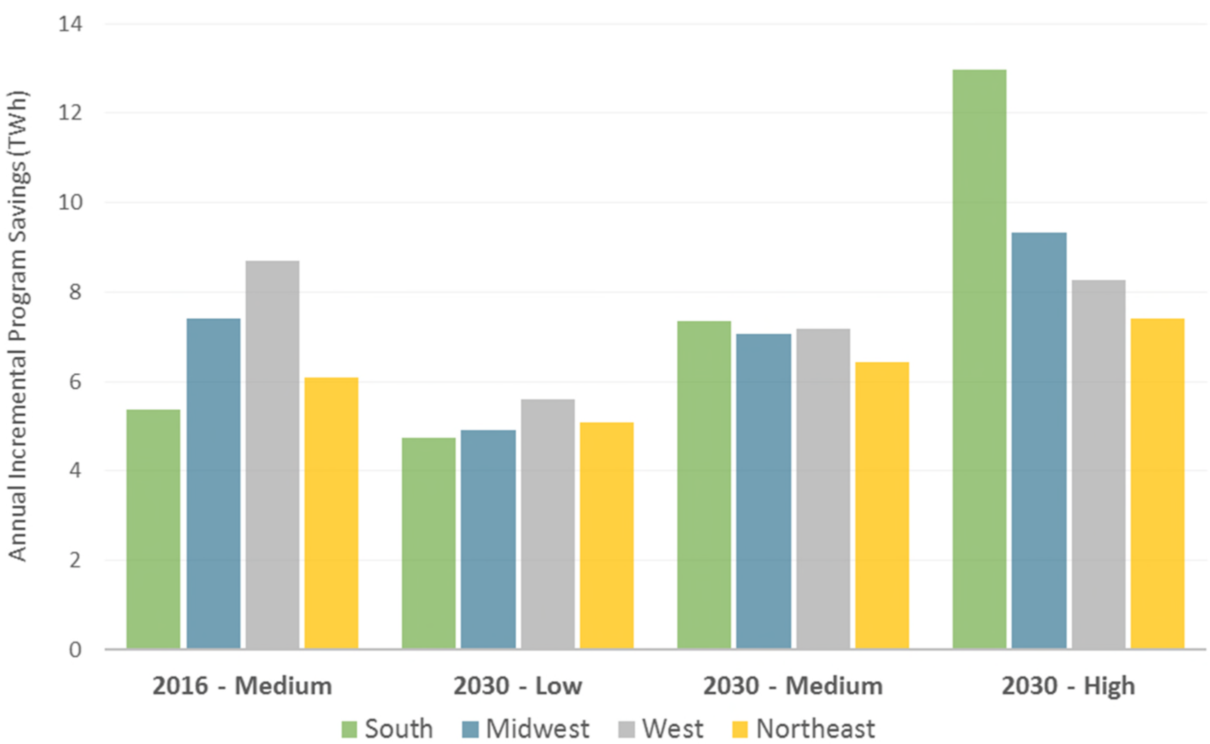
Electricity Efficiency Program Savings: National

- Efficiency programs funded by utility customers saved 27.5 TWh in 2016, equal to 0.73% of retail sales
- **Medium case:** Annual savings increases modestly to 28 TWh in 2030; savings higher in 2025 than 2030
- **High case:** Annual savings increases to 38 TWh/year in 2030 (38% higher than savings in 2016)
- **Low case:** Annual savings decreases to 20.3 TWh in 2030 (27% lower than savings in 2016)

Current and projected annual incremental electricity savings (TWh)

	Annual Electricity Savings (TWh)			
Scenario	**2016**	**2020**	**2025**	**2030**
Low		23.6	22.5	20.3
Medium	27.5	27.8	29.6	28.0
High		31.7	38.9	38.0

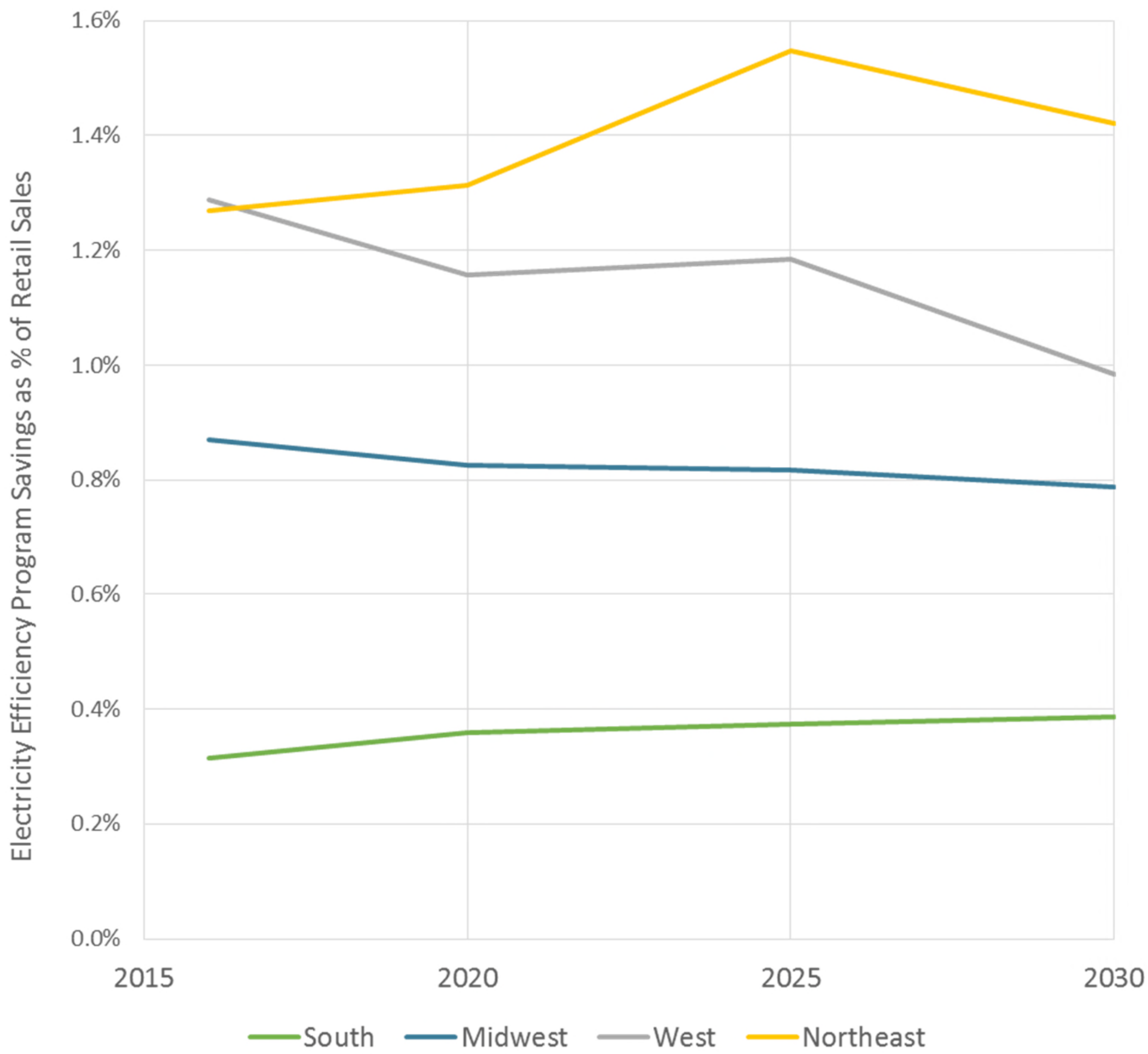
Electricity Efficiency Program Savings: Regional



Annual incremental program savings by region in 2016 vs. 2030 scenarios

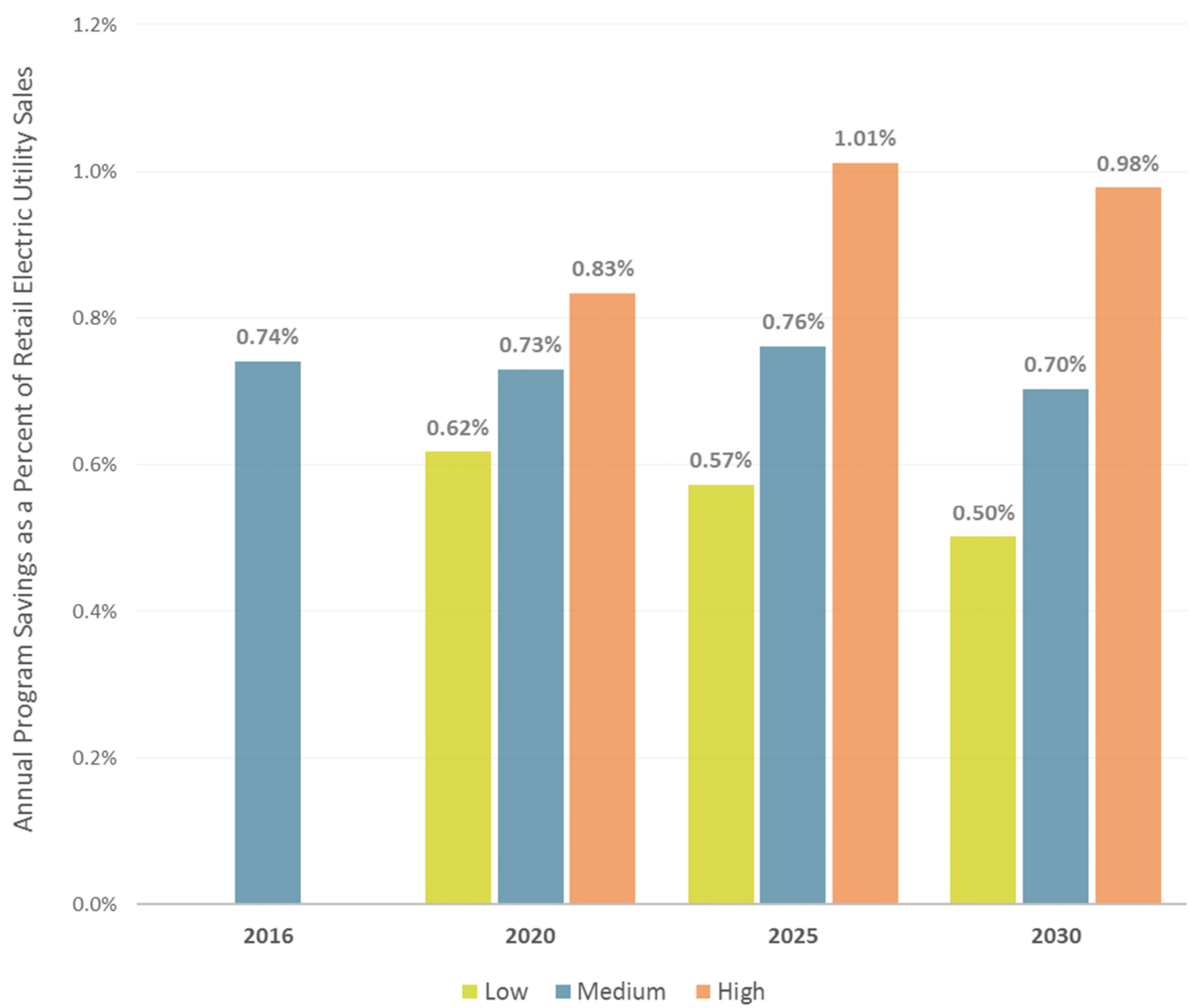
- **Medium case**: Savings fall in West and Midwest but increase in Northeast and South
  - Mature markets in West (and NE) face rising baselines, saturation in lighting
  - More NE states have elevated their policy commitments (NY, NJ) than in the West
- **High case**: Dramatic savings increases in the South (12.9 TWh)
  - Assume large states achieve close to achievable potential (TX, FL)
  - Attractive business model (OK, NC, SC) or EERS (MD, VA)

Electricity Program Savings by Region: Medium Scenario



- **Northeast and West**: Savings as % of retail sales have similar trajectories; steeper decline for the West from 2025-2030
  - Some NE states (NY, NJ) have adopted new, aggressive savings targets
  - Many Western and NE states have not addressed the sunsets of their current policies or are impacted by standards or market transformation in later years
- **South** has lowest savings levels but steady, shallow increase to 2030
- **Midwest:** Steady decrease to 2030

Annual Savings as Percent of Retail Sales



- **Medium case**: Savings as % of retail sales are flat to 2030 (0.70%)
- **High case**: Savings increase to ~1% of sales in 2030
  - 24 states saving 1% or more
  - Flatten after 2025 as savings baselines rise for end uses & equipment
- **Low case:** Savings decrease to 0.5% of sales in 2030
  - Only 11 states save 1% or more

POUs and Rural Electric Coops: Spending and Savings

		Spending from POU Electricity Efficiency Programs ($B)				Savings from POU Electricity Efficiency Programs (TWh)		
	2016	2020	2025	2030	2016	2020	2025	2030
Low		0.7	0.8	0.8		3.2	3.0	2.9
Medium	0.6	1.0	1.1	1.2	3.8	4.9	5.3	5.4
High		1.1	1.3	1.5		5.8	6.6	7.1

Spending

- Publicly owned utilities (POUs) and rural electric coops account for 12%-14% of U.S. EE program spending in three scenarios
- Spending projected to double in the medium case
- Spending is concentrated in relatively few states: Five states (CA, WA, TX, TN, MN) account for 67% of projected spending in 2030 by POUs and coops

Savings

- POUs and coops account for 14%-19% of U.S. program savings in three scenarios
- POU and coop program savings are projected to increase by ~50% in the medium case and nearly double in the high case

Discussion:
Key Issues and Challenges

Market and Policy Context

- A changing economy and shifting policy objectives complicate forecasting of future electricity loads.
  - EIA load growth forecast is very low compared to past load growth: 0.59%/year to 2030 vs. 1.3%/year since 1990
  - Energy intensity decreasing in all economic cycles due to structural changes in economy, fuel economy improvements and success in implementing complementary efficiency policies
  - Beneficial electrification (e.g., adoption of electric vehicles, heat pumps and selected industrial applications) may increase electricity sales over the longer term (to 2050)
- The cost of electricity supply options has declined.
  - Declining costs for gas-fired and renewable generation technologies and relatively low gas prices translate into lower avoided costs (and reduced EE program benefits); program administrators face ongoing challenges in designing cost-effective EE portfolio
  - Evolving generation mix and resource needs of utilities are changing the value proposition that efficiency resources face
    - — Result is greater focus on time-varying value of EE resources, more emphasis on controllable loads, and more interest in bundling demand-side options to provide grid services

Market and Policy Context (cont.)

- Electricity savings from complementary strategies such as equipment standards and building codes will increasingly impact utility efficiency programs.
  - In recent years, many states have adopted more stringent building codes, and federal and state governments have adopted new or updated standards for appliances and equipment.
  - Standards raise the baseline against which savings from utility customer-funded programs are measured, influencing the size of remaining achievable potential and the mix of technologies targeted by voluntary programs.
  - For the last decade, estimated annual savings from electricity efficiency programs were roughly comparable to annual savings from standards (~27 TWh per year between 2002 and 2015 for standards).
  - For the 2017-2030 period, standards that have been previously approved and take effect during the next 5 years may produce significantly higher savings (~40-50 TWh per year) compared to the previous period.
  - Increasing savings from standards makes it more challenging for administrators of utility customer-funded programs to obtain cost-effective savings, particularly in later years of our study period.

Market and Policy Context (cont.)

- Market transformation: Energy efficiency products and services
  - Some end users are investing in higher efficiency products and services on their own because of technological innovation (e.g., declining costs, higher quality products)
  - Indirect market effects of efficiency programs and imminent standards can also strongly influence the pace of market transformation for products and services
    - Example: Market for general service lamps (mainly screw-type light bulbs known as A-line lamps) is changing rapidly
  - The National Electrical Manufacturers Association reports that shipments of LEDs accounted for 36% of A-line lamp sales in 2017 compared to <1% in 2011; Share of CFLs decreased to 8.4% in 2017
  - Implications for future residential efficiency programs
    - Today 45% of lifetime savings come from residential lighting programs
    - CFLs and LEDs will become the new savings “baseline”
    - Program administrators will have to look for additional technical opportunities for saving electricity to offset reliance on lighting programs

Energy Efficiency Program Policies and Implementation Issues

- State leadership drives institutional frameworks for energy efficiency
  - Program success depends on customer acceptance and adoption. Stakeholder input on program design is crucial
  - Measurement and verification of savings is important
  - Given disincentives to efficiency under traditional regulation, states with efficiency policy goals can consider aligning the utilities' financial interests with these goals
- Program portfolios are changing and will need to evolve to continue to capture cost-effective electricity savings
  - Residential – new technical opportunities to offset lighting
  - C&I – focus more on small and mid-size customers if states adopt opt-out for large C&I
  - Achieving deeper savings – In states with stringent EE goals, programs will need to achieve deeper savings and broader reach, in terms of market penetration and targeting underserved markets, and new, innovative programs will need to be designed
    - Strategic energy management/ISO 50001; behavior-based programs
    - Broadening value proposition for EE: time-varying and locational value
    - Competitive procurements to meet distribution system needs: bundles of demand-side services
    - Integrated delivery of electric and gas efficiency programs
    - Leverage state/local govt. programs and combine financing (e.g., PACE) with technical assistance

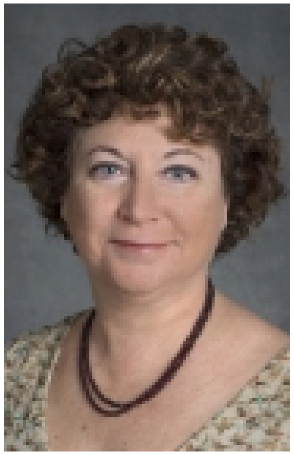
Conclusion

- Portfolio of efficiency programs in each state is likely to evolve significantly over the time horizon of this study; potential evolution in drivers and delivery mechanisms
- Emerging challenges
  - Increased impact of complementary strategies (e.g., standards)
  - Decreasing costs of supply-side resource options
  - Adapting the value proposition for energy efficiency to reflect changing utility system needs (e.g., integrating variable generation, time-varying value of efficiency, offsetting local distribution system investments)
  - Program success depends on customer acceptance and adoption; stakeholder input on program design is crucial
  - Need for more advanced methods to measure and verify savings
- Institutional framework for energy efficiency
  - Our high scenario assumes that states newer to efficiency provide leadership in defining efficiency policy objectives, establish clear roles and responsibilities for administrators, and devote sufficient staff resources to effectively oversee efficiency portfolios.
- Degree to which program administrators and state regulators address these challenges is likely to heavily influence the longer term pathway of spending and savings for electricity efficiency programs

Project Team

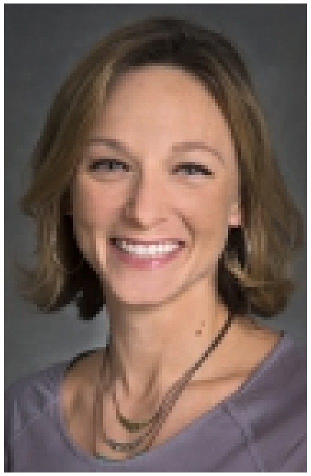
Principal Investigators

Chuck Goldman
cagoldman@lbl.gov



Lisa Schwartz
lcschwartz@lbl.gov

Sean Murphy



Natalie Mims Frick

Ian Hoffman

Greg Leventis